Undergraduate Catalog of Courses

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Environmental and Earth Science

Saint Mary's College of California

ENVIRONMENTAL AND EARTH SCIENCE

The School of Science offers several courses that cover various aspects of earth science and a number of interdisciplinary courses dealing with issues critical to earth's environment and human society. These courses are valuable to those with an interest in environmental or earth science topics that will increase their basic understanding of the earth and its environment and for those whose careers would benefit from such understanding. *Environmental and earth science used to be called natural science.*

FACULTY

Steven Bachofer, Ph. D., *Professor*
Carla C. Bossard, Ph. D., *Professor*
Gerard M. Capriulo, Ph. D., *Professor*
William E. Perkins, Ph. D., *Adjunct Professor*

COURSES

LOWER DIVISION

40 Geology and the Earth

A general introductory course in earth sciences, with emphasis on physical geology and its effect on the environment. The earth's structure, composition and physical features create the geological environment for mankind. The physical environment such as climate also has an effect on the geological environment, and both in turn can affect the living environment of societies on the earth through the processes of earthquakes, landslides and floods. Some of the major environmental problems facing mankind today are discussed from their geologic perspective. Offered in the fall semester with three hours of lecture per week. No prerequisites, but must be accompanied by **Environmental and Earth Science 41.**
**This course fulfills the Area B lab science requirement.*

41 Lab

Lab to accompany **Environmental and Earth Science 40.** One lab per week for three hours. Local field trips are part of the course. Laboratory fee: TBA.

50 Historical Geology

A general introductory course in earth sciences, with emphasis on historical geology leading to an understanding of the geologic record of life (paleontology) and environments (stratigraphy). The course starts with a discussion of the historical development of geologic ideas that lead to an understanding of the major earth systems. Plate tectonics, mountain building and structural deformation, the basic elements of stratigraphy, and sedimentary environments are discussed along with correlation and dating techniques. The second segment of the course focuses on the biosphere, reviewing the diversity of six kingdoms of life and their historic fossils. The fossil record is then integrated with the geologic record, as well as the general stratigraphy and paleontology for the various geologic eras and periods of the earth's history. Offered in the spring semester with three hours of lecture per week. No prerequisites, but must be accompanied by **Environmental and Earth Science 51.**
**This course fulfills the Area B lab science requirement.*

51 Lab
Lab to accompany **Environmental and Earth Science 50.** One lab per week for three hours. Local field trips are part of the course. Laboratory fee: TBA.

60/61 Urban Environmental Issues
By studying brownfields and Superfund sites, students in the Environmental Science and Studies Program may find this course particularly useful. A significant portion of the student's grade will depend on his or her input to classroom discussions and the student team project. The student teams should research a few possible sites at one location (dependent on class enrollment). As the class progresses, we will invite in some guest speakers representing government agencies, community outreach organizations, and possibly developers to allow students to explicitly hear from individuals representing the different perspectives involved in a redevelopment area. The class will have also both group and full-class discussions. This course fulfills the Area B lab science requirement with a weekly three-hour lab section. An important goal is to give back to the community while we study these redevelopment activities.

92 Introduction to Environmental Science
Physical, chemical, biological, and cultural dimensions of environmental problems are examined in this course. It surveys the historical roots of these problems and then considers components such as population pressure, air and water pollution, global change, desertification, deforestation, biodiversity loss, habitat destruction, land use planning, energy and other resource utilization, acid rain, global warming, and public health. An introduction to ecological principles is provided. Course fulfills the Area B requirement. Must be accompanied by **Environmental and Earth Science 93.**

93 Lab
Lab to accompany **Environmental and Earth Science 50.** One lab per week for three hours. Local field trips are part of the course. Laboratory fee: TBA.

UPPER DIVISION

100 Hydrology—Rivers and Groundwater
An introduction to hydrology, with specific emphasis on rivers and streams as well as groundwater. In the first half of the course, we examine all the facets of the water cycle, properties of water and issues related to surface water problems. In the second half, we work more closely with groundwater issues, Darcy's Law and subsurface flow problems. Groundwater contamination and general water quality issues will also be discussed. Special emphasis will be given to the hydrology of northern California. Offered every other year in the spring term. Three hours of lecture per week. No lab, but problem sets. *Prerequisites:* Area B math course or permission of instructor.

110 Geographic Information Systems
Maps have been used for thousands of years, but it is only within the last few decades that the technology has existed to combine maps with computer graphics and databases to create geographic information systems, or GIS. GIS are used to display and analyze spatial data, which are tied to a relational database. This connection is what gives GIS its power: maps can be drawn from the database and data can be referenced from the maps. When a database is updated, the associated map can be dynamically updated as well. GIS databases include a wide variety of information: geographic, economic, social, political, environmental and demographic. Although these systems started in the earth sciences, they have rapidly expanded into the business and government arenas to the point where today, over 80 percent of the applications are found in city planning, business evaluations, marketing, rapid response systems and a plethora of other activities. In the class and lab exercises, students learn to use ArcView 9.1, one of the standard GIS application programs, and identify and solve basic mapping problems. Examples include database generation, map generation, interpretation of environmental and marketing data, the analysis of these data for pattern recognition and final presentation graphics. By the end of the course, a student should be a competent user of ArcView 9.1. Offered every other year in the fall term with three hours of lecture and a three-hour lab. *Prerequisites:* Area B math course or permission of the instructor. Laboratory fee: TBA.

140 Environmental Geology—Natural Disasters
A course that concentrates on natural disasters and major environmental issues. Concerned with how the natural world operates, and in so doing destroys humans and their works. We examine specific geologic hazards (volcanoes, earthquakes, floods etc.) and explore how one might either predict their occurrence or ameliorate their results. We later examine some the major environmental issues facing the world, culminating with an extended examination of climatic change. Man's influence on each of these areas will be examined in some detail. Offered every other year in the spring term. Three hours of lecture , no lab but problem sets. *Prerequisites:* Area B math course or permission of the instructor. Laboratory fee: TBA.